General remarks

The invention proposes a technical, non-artistic method and a device to paint an arbitrary surface of a building with a design instead of simply painting the surface uni-color, as it is common today. Surfaces of buildings usually comprise an individual geometry (size and shape) and commonly also contain obstacles ([0006], Fig. 5) like balconies, doors, windows, sills or cornices at individual positions, which complicate a purely technical approach. So by today there is no technical approach known or used in practice, which is suitable to cover aformentioned surfaces entirely with a graphic design, also around the mentioned obstacles [0006].

Conventional printing methods, adapted to a mechanical XY-positioning frame, are unsuited to print around aformentioned obstacles because of mechanical limitations.

A handheld printer (Saund [US 6517266], Slupe [US 6942402], Hess [US 20020158955] is principally well suited, since it can be operated like a paintroll. But there are some major technical problems to be solved: First, with the use of house paint, which dries relatively slowly, technical provisions have to be found to avoid smearing. Second, technical provisions have to be found to be able to print the entire surface despite the fact, that none of the known position measurement systems is suited to measure a position in the presence of the mentioned obstacles all over the surface.

Data preparation and position measurement as taught by Saund [US 6517266], Slupe [US 6942402] and Hess [US 20020158955], especially, are unsuited to enable a color design to be entirely applied to a surface comprising the mentioned obstacles.

This invention proposes to paint the aformentioned surfaces entirely by using a position-controlled handheld printer with added functionality and by providing methods to paint the surfaces entirely with a slowly drying paint.

Remarks regarding the amandments in the claims:

Claims 21-63 are cancelled. Claims 64 and 65 are new.

New claim 64 claims a method of applying a color design to a surface of a wall around obstacles (16, Fig. 5) like balconies, doors, windows, sills or cornices, with a movable application device having a first position measurement system configuered to measure its position relative to stationary components, further having a computer control, paint application elements and rollers or sliding elements, whereby, when the application device is moved on the surface, positions of the paint application device are measured and paint application by the paint appliction elements is controlled based on the measured position.

The method comprises a first step. This step includes positioning multiple stationary components of the first position measurement system at fix positions and defining a reference coordinate system.

Support for "positioning multiple stationary components of the first position measurement system at fix positions and defining a reference coordinate system" may be found in [0035] "At the beginning of the work procedure the satellites as a subsystem of the first measurement system , see Fig. 2, Fig. 5, Fig. 6, Fig. 8, are mounted by the operator at fix positions. They define the reference coordinate system..." and "...But by mounting a large number of satellites the covarage of the object face can be optimized".

The step further includes to measure geometric properties of the wall within the reference coordinate system to generate a first data set, which is a *digital representation* of the geometry of the wall

Support for "...measure geometric properties of the wall within the reference coordinate system to generate a first data set, which is a *digital representation* of the geometry of the wall" may be found in [007] „...it is a prerequisite, that the object face has been recorded previously by measurement techniques, resulting in a digital object, wich is for example a CAD-representation of the surface..." and in and in [0036] „It is recommended to mount the satellites already when evaluation the geometric properties of the object face. By this

the recording of the geometry and the paint application can be performed withion the same coordinate system."

Subsequently the method comprises a second, paint applying step, the step including applying paint alongside a region containing previously applied paint by moving the application device in a way, that the wheels do not get into contact to the previously applied paint, whereby the application device is configured such, that the array of paint applying elements is protuding laterally over the wheels

Support may be found in [0048] "The array of paint applying elements is designed to laterally protrude the rollers 3 by a defined length, the overlap 51, see Fig. 11. The overlap is beneficial, when using slowly drying paint, because it allows painting without getting the wheels 3 into contact with previously applied, wet paint." And in Fig. 16.

Hess [US 20020158955] does teach in [0051], that "there is a slight overlap between printheads 52 (and thus printer positions) in each successive print swath. In this manner the distinction between print swaths is minimized" (Office communicationn 12/24/2009). Hess' [US 20020158955] definition of "overlap" distinguishes from the nomenclature in this patent application. Hess [US 20020158955] defines "overlap" as the overlapping region between 2 neighboring print - swaths. Our definition of "overlap" is the distance between the roller (or sliding element) and the outmost protruding paint application element, see Fig. 11. So the teaching of Hess [US 20020158955] is also different from this patent application. Hess [US 20020158955] fails to propose a technical solution for the problem, that his wheels could pollute previously applied paint in a subsequent swath. As can be seen in Fig. 8a Hess [US 20020158955] also uses rollers 36 to drive the application device on the surface. These are located more close to the side edges 35 then the printheads 52. Clearly Hess' [US 20020158955] printheads 52 (arrays of paint applying elements) do not laterally protrude over the the rollers 36. So in a subsequent print swath, the rollers will be in contact with the previously applied fresh paint, when he tries to maintain an overlap between subsequent printhead positions.

Also Saund [US 6517266] uses rollers (wheels 258). These are mounted at each side of his handheld printer, see Fig. 3 and will also be in contact to previous applied paint, if used for the purpose of this invention.

The paint applying step further includes

applying paint at a position, where paint has to be applied, but due to disturbed intervisibility between the application device and a minimum required number of stationary components the first measurement system is unable to provide valid position data by

- changing the position of the paint application device to a position, where a valid position is available from the first measurement system
- and moving the application device from that position to the position, where no valid position data was available, whereby position is calculated by the computer control based on the last valid position of the first measurement system and movement data from a second measurement system, which measures a motion of the paint application device.

This step addresses the fact, that e.g. due to the mentioned obstacles of the surface at some points of the surface intervisibility between the application device and a minimum required number of stationary components the first measurement system can be disturbed, resulting in the fact, that the first measurement system is unable to deliver valid position information at these points. Based on a handheld printer as taught by Slupe [US 6942402], Saund [US 6517266] or Hess [US 20020158955], at these points principally no paint application is possible. The surface cannot be painted entirely.

The problem is solved by use of a second measurement system, which measures a motion of the paint application device.

Support may be found, for example in [0016] "...move the paint application device over the surface, until the first measurement system supplies a valid position", [0012] „The systems herein referred to as second measurement system measure the motion of the paint application device for example by sensors, which are included in the paint

application device and which do not utilize fixed landmarks.", in [0016] "If there are new data available from the first measurement system, the calculation of the actual position may be based on actual position data as well as past position data. If not, a message will be sent to the operator and the subsequent position calculation will only be based on actual measurement data from the second measurement system and past position information.", and [0017] "If he (the operator) has identified an aforesaid region, he is advised to bring the paint application device into contact with the object face at a point of known position and to move the device into the said region shortest or quickest path.."

The problem was addressed in earlier claim 29, which was rejected in the examination report posted 12/24/2009 and is now cancelled. Rejection was related to [Slupe [US 6942402], col 11, ln 55-67], citing, that "prior art (Slupe [US 6942402]) teaches when the printer is out of boundaries of the image that is to be formed on the object, the microprocessor indicates how the printer needs to be moved.."

The herewith amended claim 64 now clearly states, that paint is applied at positions, *where paint has to be applied*, but (...) the first measurement system is unable to provide valid position data...". Slupe [US 6942402] does not address the problem how to proceed, if it has to be printed at positions, where no position data is available. So also don't do Saund [US 6517266] and Hess [US 20020158955].

The amended claim further describes the procedure in detail how the operator has to proceed in the case, when paint has to be applied at a position, where due to disturbed intervisibility between the application device and a minimum required number of stationary components the first measurement system is unable to provide valid position data: By changing the position of the paint application device to a position, where a valid position is available from the first measurement system; and by moving the application device from that position to the position, where no valid position data was available, whereby position is

calculated by the computer control based on the last valid position of the first measurement system and movement data from a second measurement system, which measures a motion of the paint application device.
Slupe [US 6942402], Saund [US 6517266] or Hess [US 20020158955] fail to teach the complex inventive procedure as proposed in this application.

Slupe [US 6942402] further does not perform a measurement of a movement at all. He only *calculates* velocity out of position signals and utilizes it for several purposes other then the purpose within new claim 64. [col 10, ln2-4]: "While manual printer 142 is moving through an imaging operation, processor 136 computes the velocity." A person skilled in the art usually calculates a velocity by calculating the derivative of a position at at least two points of time.

But also if Slupe [US 6942402] would actually *measure* a velocity, he does not give any hint, that he first relocates the application device and second uses a measured velocity to calculate an actual position based on the last valid position of the first measurement system and movement data from a second measurement system. So also do not Saund [US 6517266] and Hess [US 20020158955].

By intruducing the new claims 64 and 65 accomodating all the prior art and argument of the examiner the applicant now believes, that this patent application is in a state to comply with the rules. If the examiner finds reason, that the application still does not comply with the rules, applicant asks for a petition and the possibility of an oral utterance.

Provisional obviousness-type double patenting rejection:

Since a double patenting diagnosis is based on the claims of the related patent applications applicant sincerely inquires to take into consideration this technical explenation:

Copending patent application No. 11813009 (hereinafter '009) claims a method, how to evaluate the positions of reference marks (stationary component) of the measurement system. The method is described in detail in the characterizing section of claim 17 in '009. So '009 clains a specialized subroutine, which is carried out during setup of the measurement system for a handheld printer.

The present application as well as Saund [US 6517266], Slupe [US 6942402] and Desormeaux [US 6312124], assume, that the position, i.e. the coordinates of the stationary components are readily defined prior to paint application, e.g. by measureing the x- and y-coordinates of every stationary component using a ruler or a tape meassure.

All cited documents are quiet in proposing a fast and effective way to measure and evaluate the positions (coordinates) of the stationary components. This is disclosed in '009.

If the examiner has any questions, applicant can be reaches at +49(761)203-8061.

Sincerely yours

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